



Rewarding Learning

**General Certificate of Secondary Education
2020**

Centre Number

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Candidate Number

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Mathematics

Unit M3

(With
calculator)



Higher Tier

PRACTICE PAPER

TIME

2 hours

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in the question paper.

Complete in blue or black ink only. **Do not write in pencil or with a gel pen.**

Answer **all twenty-nine** questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You can use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100

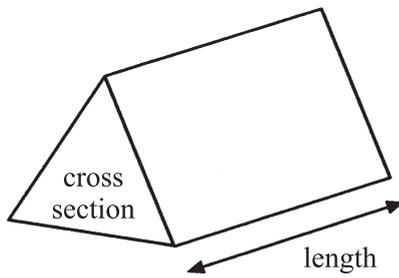
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a ruler, compasses and protractor.

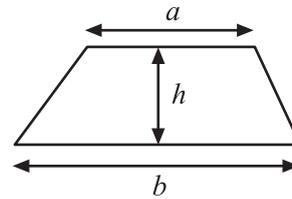
The Formula Sheet is on page 2.

Formula Sheet

Volume of prism = area of cross section \times length

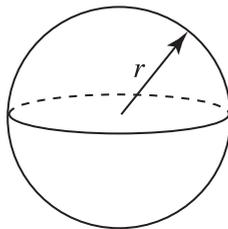


Area of trapezium = $\frac{1}{2}(a+b)h$



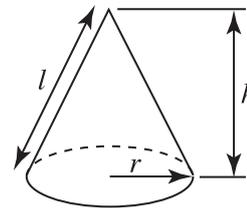
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

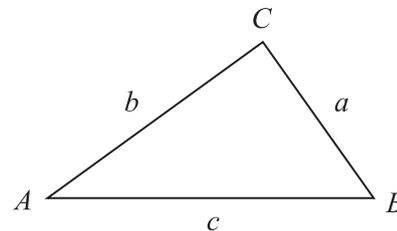


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



1 Arlene hired a spin bike.

There was a fixed charge of £7.50 and a hire fee of £13.85 per week.

She paid a total of £118.30

How many weeks did she hire the spin bike for?

Answer _____ [3]

2 There are 69 members in a running club.

All the members ran a marathon or a 10K.

30 members ran the 10K.

2 out of 3 of those who ran the marathon were men.

40% of those who ran the 10K were women.

Work out the number of men in the running club.

Answer _____ [4]

3 Work out the size of the angle x in the diagram below.

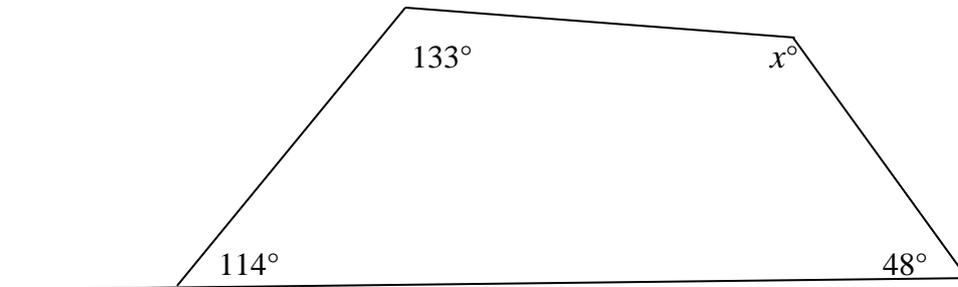


Diagram not drawn accurately

Answer _____ $^\circ$ [3]

4 In a box $\frac{4}{9}$ of the counters were blue.

Linda added 15 blue counters to the box.

Now $\frac{7}{12}$ of the counters are blue.

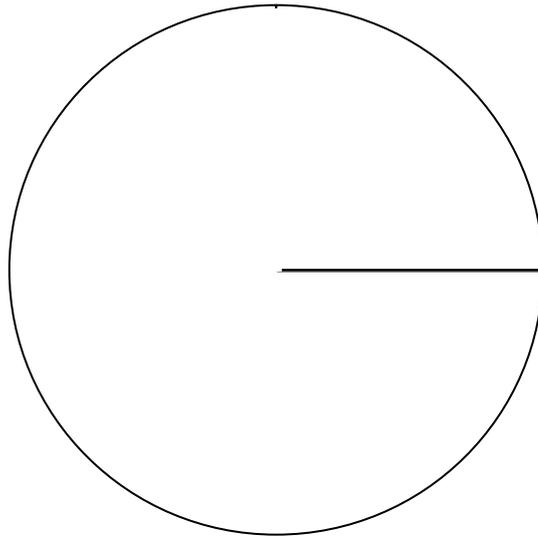
Work out how many counters were in the box at the start.

Answer _____ [4]

5 Nigel recorded the number of red, black , silver and white cars for sale.

Red	Black	Silver	White
44	36	84	16

Draw an accurate pie chart to show this information.



6 ABCD is a rhombus.

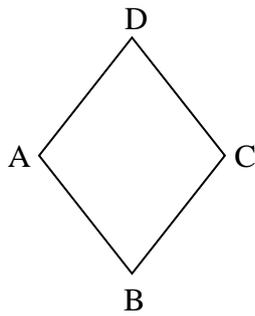


Diagram not drawn accurately

$$BA = 7 \text{ cm}$$

$$AC = 8.4 \text{ cm}$$

$$BD = 11.2 \text{ cm}$$

(a) Work out the perimeter of ABCD.

Answer _____ cm [1]

(b) Work out the area of ABCD.

Answer _____ cm² [1]

7 (a) Work out $7(x - 3)$

Answer _____ [1]

(b) $V = 3t - 2n$

Find the value of t when $V = 13$ and $n = 4$

Answer _____ [3]

8 Lily bought a car for £9650

She sold it at a loss of 18%

Work out the selling price.

Answer £ _____ [3]

9 Cadence buys x books at £2.60 each and y pens at 64p each.

Write down an expression for the total cost T in £

Answer $T =$ _____ [2]

10 Solve $7x + 4 = 1 - 2x$

Answer $x =$ _____ [3]

11 The number of students choosing Maths at 'A' level decreased from 74 to 59 in a school.

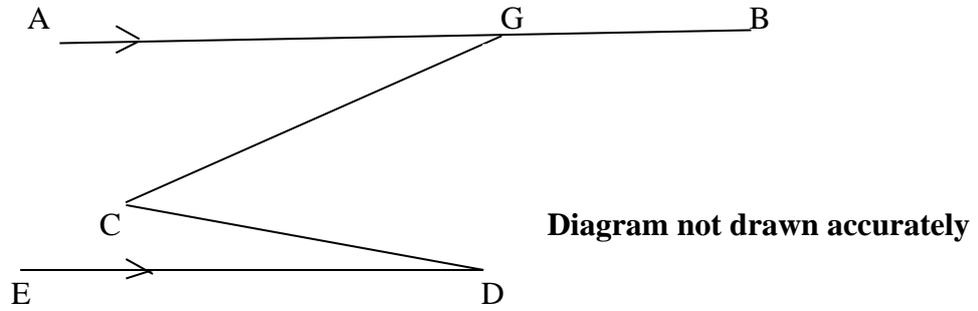
Calculate the percentage decrease.

Answer _____ % [3]

12 The lines AB and ED are parallel.

G is the point on AB such that angle BGC = 155°

Angle EDC = 42°



Calculate the size of angle GCD.

Answer _____ $^\circ$ [3]

13 Factorise $7x - 4x^2$

Answer _____ [1]

14 ABCD is a trapezium in which $AB = 20$ cm and $DC = 28$ cm.

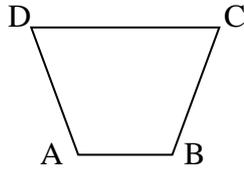


Diagram not drawn accurately

When a semicircle is drawn on top of ABCD with DC as its diameter the **total** area of the semicircle and the trapezium is 847.876 cm^2

Calculate the perpendicular height of the trapezium.

Answer _____ cm [5]

15 One hundred people were asked in a survey if they had ever gone to Bangor, Newcastle or Portrush on holiday.

14 had gone to Bangor and Newcastle;

11 had gone to Bangor and Portrush;

20 had gone to Portrush and Newcastle;

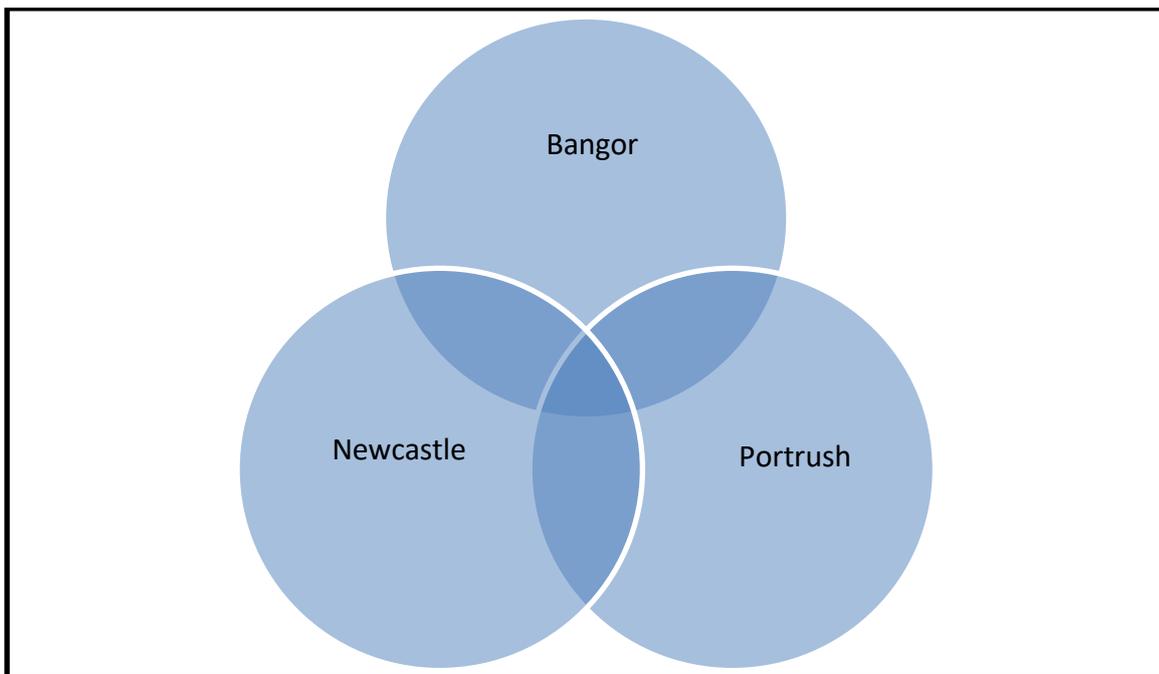
33 had gone to Bangor;

47 had gone to Newcastle;

49 had gone to Portrush;

3 had gone to none of these places.

(a) Complete the Venn diagram to represent the number of people who had gone to each place.



[3]

(b) Hence, calculate the number of people who had gone to Bangor, Newcastle and Portrush.

Answer _____ [2]

16 The number of points scored by each team in gaelic football matches last week were recorded and shown below.

Number of points	Frequency
1 - 5	6
6 - 10	5
11 - 15	3
16 - 20	4
21 - 25	2

Which class interval contains the median number of points.

Answer _____ [1]

17 (a) Write 360 as a product of prime factors.

Answer _____ [2]

(b) What is the smallest whole number 360 could be multiplied by to make it a square number?

Answer _____ [2]

18 ABC is a right-angled triangle.

$$AB = 14.28 \text{ cm}$$

$$AC = 23.8 \text{ cm}$$

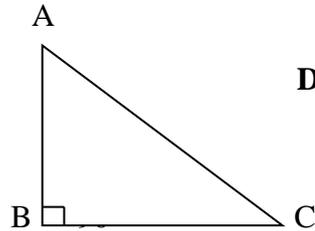


Diagram not drawn accurately

Work out the length of BC

Answer _____ cm [3]

19 Simplify $v^7 \times v^4$

Answer _____ [1]

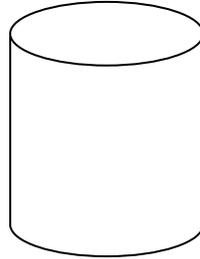
20 Willow invests £1800 in a bank at 0.85% compound interest per year.

Work out the value of her investment after 3 years.

Answer £ _____ [4]

21 A cylindrical tank holds 800 litres of oil.

The diameter of the tank is 90 cm.

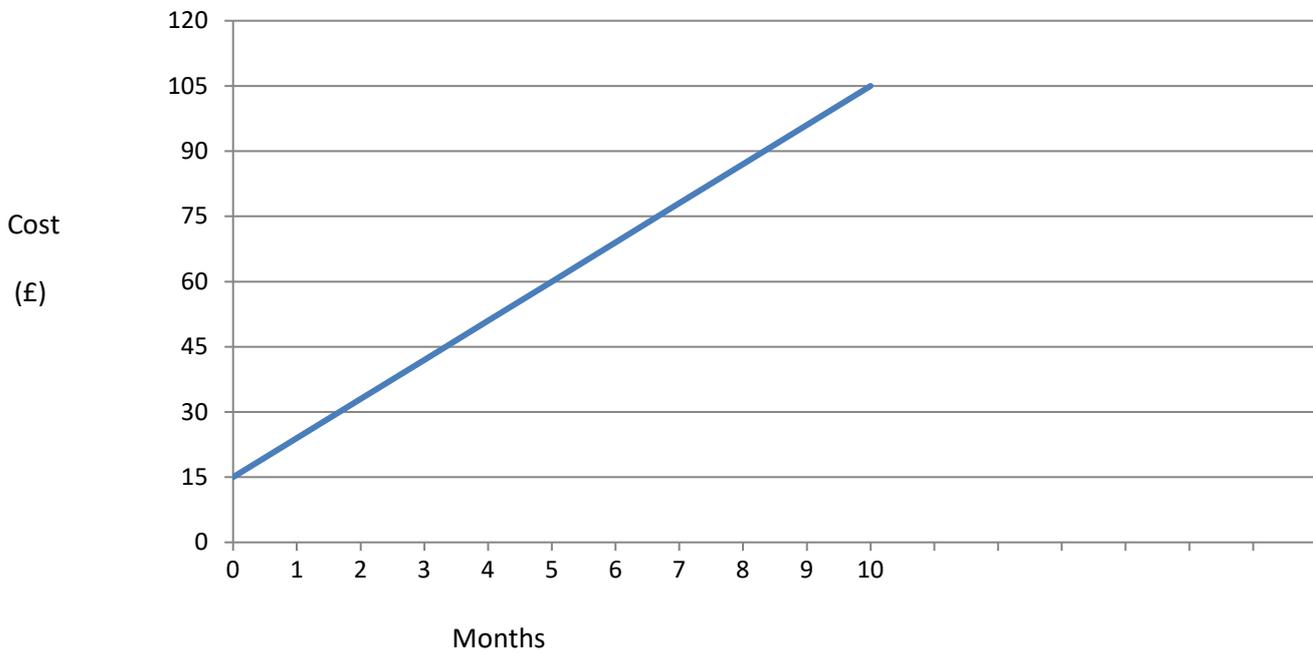


Calculate the height of the tank.

Answer _____ cm [4]

22 The graph below shows the membership cost for a society.

There is a joining fee and then a fixed amount per month.



(a) How much is the joining fee?

Answer £ _____ [1]

(b) How much is the fixed amount per month?

Answer £ _____ [2]

23 The young members of a swimming club are grouped by age (A years) as Minor, Junior or Senior.

The table below shows how many members there are in each group.

GROUP	NUMBER OF MEMBERS
Minor ($4 < A \leq 8$)	5
Junior ($8 < A \leq 10$)	10
Senior	15

The mean age of **all** the members is 11

Work out the age range for the Senior group.

Answer _____ [5]

24 A car service cost £374.82 including VAT at 20%

How much VAT was payable on the bill?

Answer £ _____ [3]

25 David recorded the weights, W kg, of 115 objects as shown below.

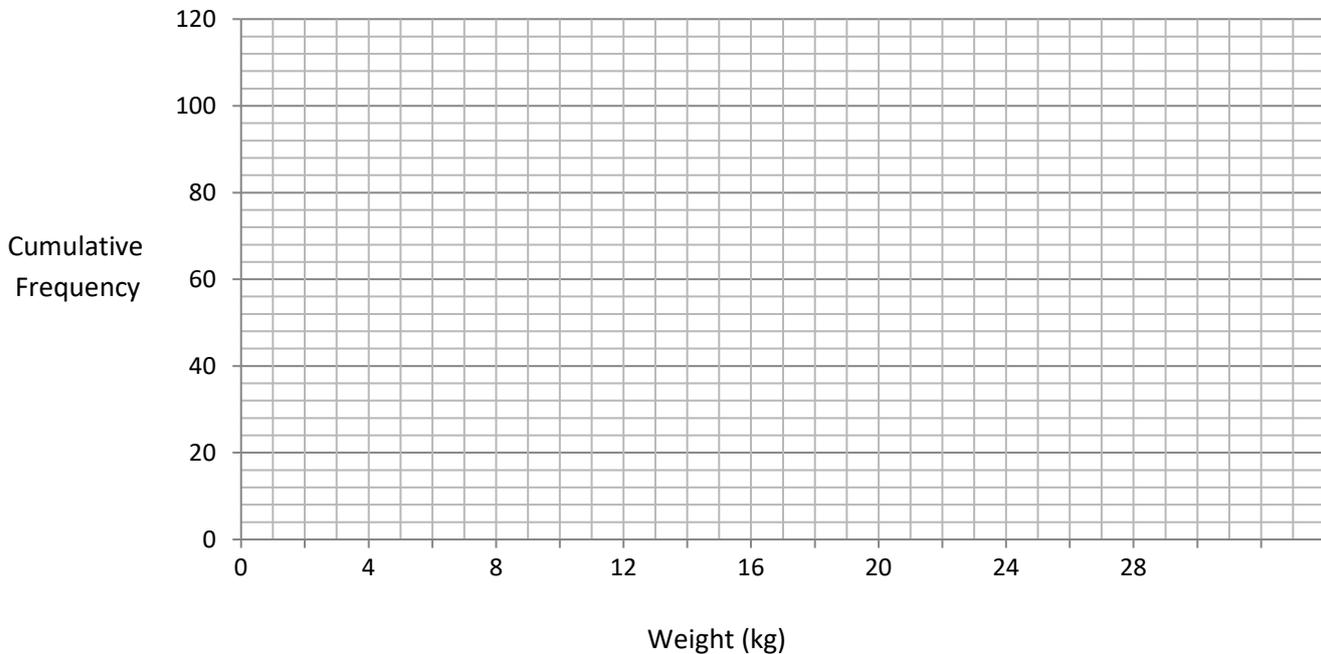
Weight (Wkg)	$0 < W \leq 5$	$5 < W \leq 10$	$10 < W \leq 15$	$15 < W \leq 20$	$20 < W \leq 25$
Frequency	8	28	42	28	9

(a) Complete the cumulative frequency table below.

Weight (Wkg) (less than or equal to)	5	10	15	20	25
Cumulative Frequency	8				

[1]

(b) Draw a cumulative frequency graph to illustrate this information.



[3]

(c) Use your graph to estimate the median weight.

Answer _____ kg [1]

(d) David discarded the heaviest 20% of the weights.

Use your graph to estimate the heaviest weight not discarded.

Answer _____ kg [3]

- 26** A straight line L is parallel to the straight line with equation $y + 2x = 4$
 L passes through $(2, -3)$

Find the equation of L

Answer _____ [3]

- 27** Simplify $\frac{18}{x^2 + 3x} \times \frac{x^2 + 5x + 6}{6}$

Answer _____ [3]

28 AOB is a sector of a circle centre O and radius 8m.

The angle AOB is Θ°

A force of 214.464 N is applied to the sector.

The pressure on the sector is 6.4 N/m^2

Work out the value of Θ .

Answer $\Theta = \underline{\hspace{2cm}}^\circ$ [4]

29 There are 30 pupils in a class.

$\frac{3}{5}$ of the boys in the class walk to school.

$\frac{9}{10}$ of the girls in the class walk to school.

6 pupils do not walk to school.

Set up a linear equation and solve it to find how many boys and girls are in the class.

Answer _____ boys _____ girls [4]

THIS IS THE END OF THE QUESTION PAPER

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